

TSSP4P38

**Vishay Semiconductors** 

## **IR Mid Range Proximity Sensors**



### LINKS TO ADDITIONAL RESOURCES





Bends and Cuts

### DESCRIPTION

The TSSP4P38 is a compact infrared detector module for proximity sensing applications. It receives 38 kHz modulated signals and has a peak sensitivity of 940 nm.

The length of the detector's output pulse varies in proportion to the amount of light reflected from the object being detected.

### **FEATURES**

- Up to 2 m for proximity sensing
- Uses modulated bursts at 38 kHz
- · Photo detector and preamplifier in one package
- · Low supply current
- Shielding against EMI
- Visible light is suppressed by IR filter
- · Insensitive to supply voltage ripple and noise
- Supply voltage: 2.0 V to 5.5 V
- (5-2008) • Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

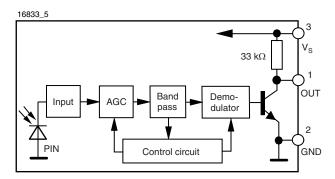
### **APPLICATIONS**

- · Object approach detection for activation of displays and user consoles, signaling of alarms, etc.
- Simple gesture controls
- parking lots

### **DESIGN SUPPORT TOOLS**

- 3D models
- Window size calculator

#### **BLOCK DIAGRAM**



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- Differentiation of car arrival, static, car departure in
- · Reflective sensors for toilet flush
- Navigational sensor for robotics



eЗ

RoHS COMPLIANT

HALOGEN

FREE

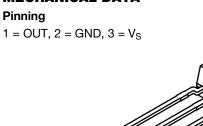
GREEN



## TSSP4P38

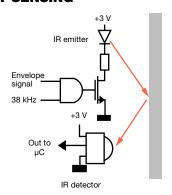
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### **MECHANICAL DATA**



23198

### PROXIMITY SENSING



### **ORDERING CODE**

2

TSSP4P38 - 2160 pieces in tubes

PARTS TABLE							
Carrier frequency	38 kHz	TSSP4P38					
Package		Mold					
Pinning		1 = OUT, 2 = GND, 3 = V <sub>S</sub>					
Dimensions (mm)		6.0 W x 6.95 H x 5.6 D					
Mounting		Leaded					
Application		Proximity sensors					
Special options		<ul> <li>Narrow optical filter: <u>www.vishay.com/doc?81590</u></li> <li>Wide optical filter: <u>www.vishay.com/doc?82726</u></li> </ul>					

ABSOLUTE MAXIMUM RATINGS									
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT					
Supply voltage (pin 3)		Vs	-0.3 to +6	V					
Supply current (pin 3)		Is	5	mA					
Output voltage (pin 1)		Vo	-0.3 to 5.5	V					
Voltage at output to supply		V <sub>S</sub> - V <sub>O</sub>	-0.3 to (V <sub>S</sub> + 0.3)	V					
Output current (pin 1)		lo	5	mA					
Junction temperature		Tj	100	°C					
Storage temperature range		T <sub>stg</sub>	-25 to +85	°C					
Operating temperature range		T <sub>amb</sub>	-25 to +85	°C					
Power consumption	T <sub>amb</sub> ≤ 85 °C	P <sub>tot</sub>	10	mW					
Soldering temperature	$t \le 10$ s, 1 mm from case	T <sub>sd</sub>	260	°C					

Note

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only
and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification
is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability



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<b>ELECTRICAL AND OPTICAL CHARACTERISTICS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)									
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT			
Supply current	$E_e = 0, V_S = 3.3 V$	I <sub>SD</sub>	0.25	0.35	0.45	mA			
Supply current	E <sub>v</sub> = 40 klx, sunlight	I <sub>SH</sub>	-	0.45	-	mA			
Supply voltage		Vs	2.0	-	5.5	V			
Receiving distance	Direct line of sight, test signal see Fig. 1, IR diode TSAL6200, I <sub>F</sub> = 50 mA	d	-	26	-	m			
Output voltage low	$I_{OSL} = 0.5 \text{ mA}, E_e = 0.7 \text{ mW/m}^2,$ test signal see Fig. 1	V <sub>OSL</sub>	-	-	100	mV			
Minimum irradiance	Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 5/f_o$ , test signal see Fig. 1	E <sub>e min.</sub>	-	0.1	0.2	mW/m <sup>2</sup>			
Maximum irradiance	Pulse width tolerance: $ t_{pi} - 5/f_o < t_{po} < t_{pi} + 5/f_o, \\ test signal see Fig. 1 $	E <sub>e max.</sub>	30	-	-	W/m <sup>2</sup>			
Directivity	Angle of half receiving distance	φ1/2	-	± 45	-	deg			

### TYPICAL CHARACTERISTICS (Tamb = 25 °C, unless otherwise specified)

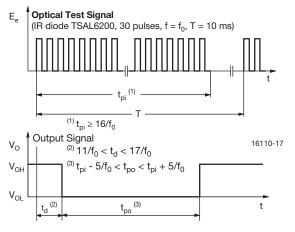


Fig. 1 - Output Active Low

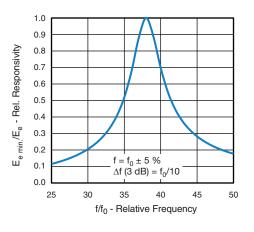
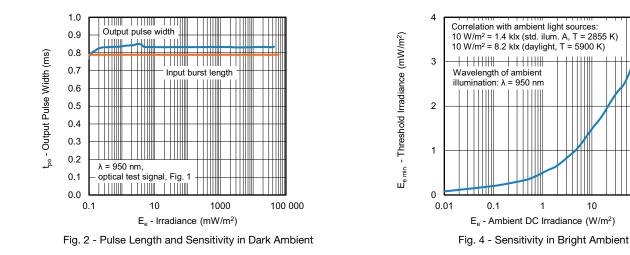


Fig. 3 - Frequency Dependence of Responsivity



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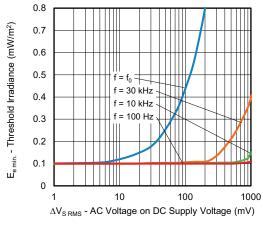


Fig. 5 - Sensitivity vs. Supply Voltage Disturbances

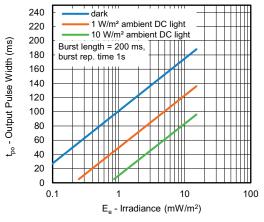


Fig. 6 - Max. Output Pulse Width vs. Irradiance

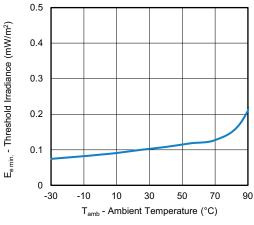


Fig. 7 - Sensitivity vs. Ambient Temperature

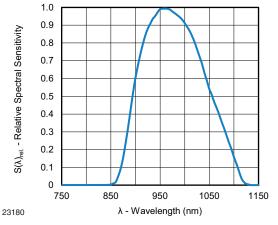


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

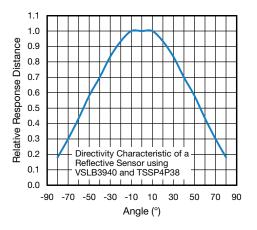


Fig. 9 - Angle Characteristic

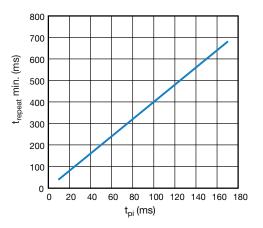


Fig. 10 - Max. Rate of Bursts

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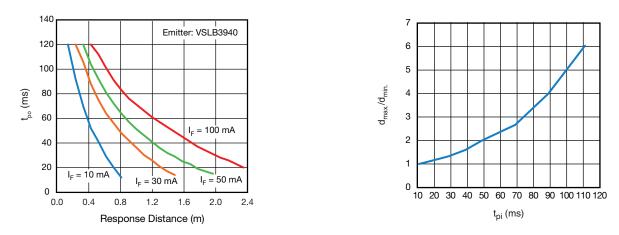


Fig. 11 -  $t_{po}$  vs. Distance Kodak Gray Card Plus 15 %



The typical application of the TSSP4P38 is a reflective sensor with analog information contained in its output. The sensor evaluates the time required by the AGC to suppress a quasi continuous signal. The time required to suppress a continuous signal is longer when the signal is strong than when the signal is weak. The result is an output pulse length which corresponds to the distance of an object from the sensor. This kind of analog information can be evaluated by a microcontroller. The absolute amount of reflected light depends on the infrared reflectivity of the object and is not evaluated. Only changes in the amount of reflected light, and therefore changes in the pulse width can be evaluated with accuracy.

There should be no common window in front of the emitter and detector in order to avoid crosstalk by guided light through the window.

the housing

The logarithmic characteristic of the AGC in the TSSP4P38 results in an almost linear relationship between distance and pulse width. Ambient light has also some impact to the pulse width of this kind of sensor, making the pulse shorter.

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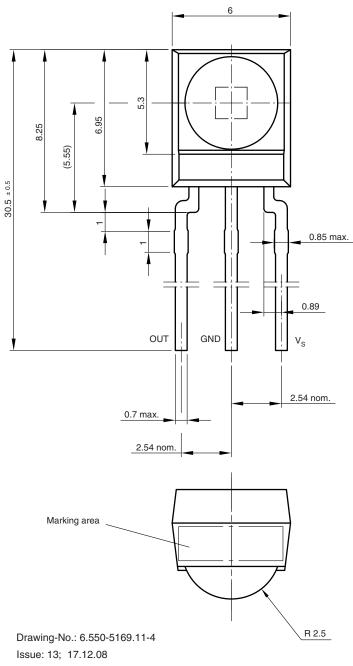
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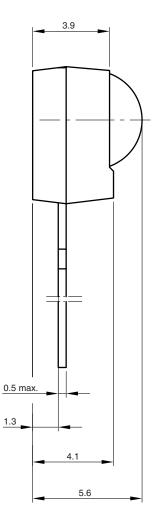


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**PACKAGE DIMENSIONS** in millimeters





Not indicated tolerances ± 0.2



technical drawings according to DIN specifications

16003



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